mtHS-40 transgene, the expression of GH RNA was restricted to the erythroid tissues. Expression was roughly limited to the spleen and blood, with no expression in the liver or brain. Expression could not be detected in the blood of mice containing the mtHS-40 transgene unless the mice were first rendered anemic, indicating that expression was erythroblasts-specific. Mice having the wtHS-40 transgene exhibited little, if any, expression.

The expression of the transgenic mice at the fetal stage also appeared to be erythroid-specific. ζ-GH transcripts could be detected in 14.5 day fetuses from transgenic mice with either mtHS-40 or wtHS-40 sequences. No ζ-GH transcripts were detected in non-transgenic control mice. A high intensity RT-PCR band was apparent in the reaction containing fetal liver RNA, consistent with the erythroid fetal liver being the major site of transcription of ζ-GH transgenes.

Changes in ζ-GH transgene expression were followed by RT-PCR. Transgenic mice having the wtHS-40 transgene exhibited the expected temporal pattern of expression during development, the level of ζ-GH transcripts was relatively high at the 9.5 day embryo stage but dropped significantly in the adult blood. In contrast, the transgenic mice having the mtHS-40 enhancer continued to express the ζ-GH transcript into adulthood. In addition, even with only one copy of the transgene, mice having the mtHS-40 expressed at a higher level than mice having the wtHS-40 enhancer, regardless of the stage of development.

These data indicated that the mtHS-40 enhancer sequence not only relieved the repression of the ζ-globin promoter in adulthood, but enhanced expression at all stages of development, even at one transgene copy per genome. When combined with the linear relationship between transgene copy

number and expression level, as described above, the results indicated that mtHS-40 can be used as an enhancer of gene expression in a variety of contexts.

Other Embodiments

It is to be understood that while the invention has been described in conjunction with he detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are also within the scope of this invention. For example, inconsequential deletions, additions, or substitutions of nucleotides within SEQ ID NOs:1, 2, or 3 (i.e., do not affect the advantageous properties of the mtHS-40 enhancer) are within the scope of the claims.

What is claimed is: